

REMARKS

Claims 1, 3-7, 9-10, 13-14, 16-23, and 28-35 were pending in the present application. The present amendment cancels claims 3, 6-7, and 32. Claims 1, 18-19, and 31 have been amended. Support for the amendment may be found at page 5, lines 1-4, page 5, line 15 to page 6, line 7, page 7, lines 6-11, all the examples, page 20, lines 1-5, and page 6, lines 8-10 of the specification. Specifically, the term "free non-blocked" isocyanate is supported at page 5, lines 1-4, page 5, line 15 to page 6, line 7, page 7, lines 6-11, and all the examples of the specification. For example, at page 5, lines 1-4 of the specification, the present application discloses "...free terminal isocyanate groups...." At page 7, lines 6 to 11 of the specification, the present application discloses that the isocyanate **can** be a masked or blocked isocyanate, which means that the isocyanate is otherwise free, non-blocked. Also, the Examples of the present application exclusively use free, non-blocked isocyanates. Claims 1, 4-5, 9-10, 13-14, 16-23, 28-31 and 33-35 are now under consideration.

The Examiner rejected claim 3 under 35 U.S.C. 112, second paragraph, as being indefinite. Claim 3 has been cancelled by the present Amendment, and therefore this rejection is moot.

Claims 1, 3, 4, 6, 9, 10, 13, 14, 16-23, 28-31 and 33-35 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 91/14727 of Vanhaeren.

The Vanhaeren reference discloses heat-curable reactive hot-melts based on (a) ethylene-rich polymers containing hydroxyl functionalities, (b) compound(s) containing isocyanate groups with at least two terminally blocked isocyanate groups and (c) optionally a tackifying resin (c.f. abstract).

Claims 1 and 31 are the sole independent claims in the present application. Claims 1 and 31, as amended, are directed to a hot-melt adhesive element comprising free non-blocked

isocyanate, at least one isocyanate-reactive polymer and/or resin, and a non-isocyanate reactive polymer wax and/or resin.

Thus, in contrast to the present invention, *Vanhaeren* compulsorily uses isocyanate groups which are terminally blocked in order to provide a certain storage stability of the hot-melts disclosed in this document. In this context, it is explicitly stated on page 6, lines 17 to 21 of the *Vanhaeren* document:

"The isocyanate groups are blocked with an extraneous blocking agents which is released on heating. Preferably the polyisocyanate has no free isocyanate groups and the rate of unblocking and hence cross-linking can be varied by controlling curing temperature." (emphasis added)

As it can be seen from this citation, Vanhaeren has nothing in common with the inventive principle of the present invention according to which solely free, i.e. non-blocked isocyanate groups are used. Thus, this reference is completely void of the idea of using free, i.e. non-blocked isocyanates in order to nevertheless provide a storage-stable and reactive hot-melt adhesive element. In contrast to the present invention, the stability of the hot melt as taught by Vanhaeren is mainly realized by a **chemical** principle according to which the reactive groups are chemically blocked with specific blocking agents.

In contrast, the present invention mainly realizes - besides of the use of unsymmetrically substituted isocyanates - the principle of a **physical** stabilization of the reactive compounds via the specific limitations recited in amended claim 1, such as a homogeneous distribution of the isocyanates in a matrix formed from at least one non-isocyanate-reactive polymer on the one hand and the at least one isocyanate-reactive polymer on the other hand. As delineated above, this inventive principle is significantly different from that of the *Vanhaeren* reference.

As a consequence of the chemical stabilization by blocking the isocyanates according to *Vanhaeren*, the temperatures at which a cross-linking takes place are significantly **higher** than those

of the present invention, because the blocking agents bonded to the isocyanate groups must be removed from the isocyanate groups by cleaving the respective chemical bondings in order to provide the required reactivity of the adhesive according to *Vanhaeren*.

However, this leads to the disadvantage that the higher curing temperature requires a higher amount of energy for heating the hot-melts. Moreover, the specific concept of the *Vanhaeren* reference leads to the disadvantage that - due to the higher temperatures necessary for the cross-linking of the hot-melts - the reactive hot-melts cannot be used with respect to temperatures-sensitive substrates or surfaces to be bonded.

A more detailed description with respect to the used temperature is given on page 9, last paragraph of the *Vanhaeren* document:

*"... and cured after application by heating to the temperature where the blocked polyisocyanate **unblock** sufficiently quickly. When using IPDI B 1530, temperatures in the range 150 °C to 200 °C are adequate."*

(emphasis added)

In contrast, in accordance with the present invention (see, e.g., claim 1), the cross-linking of the self-supporting reactive hot-melt adhesive element takes place at temperatures of from 60 °C to 160 °C. This temperature range has been added as a limitation to claim 1 by the present amendment to clearly distinguish the present invention from the prior art.

With respect to the used isocyanates, as stated by the Examiner, *Vanhaeren*, inter alia, also names unsymmetrically substituted isocyanates comprising isocyanate functions of different reactivity. However, in contrast to the present invention, even these unsymmetrically substituted isocyanates **are always blocked** with specific blocking agents under the requirements of *Vanhaeren* as noted above, thus changing nothing with respect to the difference between the principle of *Vanhaeren* and that of the present invention.

For, according to the present invention, it is the complex and specific combination of features delineated in the amended claims 1 and 31 that leads to the inventive self-support reactive hot-melt adhesive element which combines the contradictory properties of storage-stability on the one hand and a high degree of reactive groups and thus cross-linking during application at relatively moderate temperatures on the other hand. This is achieved by the specific use of unsymmetrically substituted isocyanates **and** by the physical principle -- as delineated above -- that these isocyanates are incorporated in a stabilizing matrix in **homogeneous** distribution, which is not at all mentioned in the *Vanhaeren* reference. Thus, *Vanhaeren* has nothing in common with the present invention.

To sum up, the specific combination of features is neither recognized nor realized in the *Vanhaeren* reference. The idea of the **purposeful** selection of unsymmetrically substituted isocyanates in combination with the features of claim 1 according to the present invention is not to be found or derived at all in this reference. Thus, the specific advantages of the present invention - i.e. providing a sufficient stability while realizing a high degree of reactivity - are only available in the present invention. In contrast to this, the *Vanhaeren* reference even teaches away from the present invention insofar as *Vanhaeren* deems necessary the use of **blocked isocyanates** which, however, entail the specific disadvantage of using a high curing-temperature. Thus, *Vanhaeren* completely fails to realize that it is possible to use unblocked isocyanates in a storage-stable hot-melt adhesive element which provides a high degree of activity on the one hand and an increased storage-stability on the other hand.

The *Gras* reference is cited in the *Vanhaeren* document and named by the Examiner in the outstanding Office Action for the first time. However, this document also does not suggest or disclose to the skilled practitioner the present invention because it focuses - in the same way as the *Vanhaeren* document - only on isocyanates blocked with specific blocking agents.

On the whole, the *Vanhaeren* document cited by the Examiner has nothing in common with the inventive teaching of the present invention because it does not disclose a hot-melt adhesive comprising free and unblocked isocyanates.

In contrast to this, the present invention is directed to a reactive hot-melt adhesive element comprising free isocyanate groups with different chemical reactivities in a stabilized state. Due to the fact that the isocyanates are unsymmetrically substituted, these isocyanates are specifically homogeneously incorporated in a specific stabilizing matrix. This leads to the specific combination of properties of the inventive subject-matter with respect to a high storage-stability on the one hand and a high reactivity during application on the other hand. Moreover, less energy is required because cross-linking takes place at lower temperatures, thus rendering the inventive subject-matter appropriate for adhering temperature-sensitive substrates.

Thus, the present invention is not only novel over the *Vanhaeren* reference but also inventive because it was not obvious to the skilled practitioner. The advantages related to the present invention are strong indications of non-obviousness.

Therefore, Applicants respectfully request that the Examiner withdraw the anticipation rejection of claims 1, 3, 4, 6, 9, 10, 13, 14, 16-23, 28-31 and 33-35 in view of the *Vanhaeren* reference under 35 U.S.C. § 102(b).

Claims 5, 7 and 32 are objected to for depending on rejected claims. Since claims 7 and 32 have been canceled by the present amendment, the objection becomes moot now. Claim 5 depends from claim 1. Since the rejection of claim 1 should be withdrawn for the reasons as stated above, the objection of claim 5 should also be obviated. Additionally, the limitation as recited in the non-rejected claim 32 has been now incorporated into claim 31, from which claim 32 previously depends. This constitute another reason that the rejection of claim 31 and its dependent claims 33-

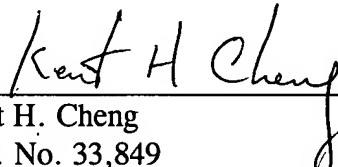
35 in view of the *Vanhaeren* reference should be withdrawn. Accordingly, we respectfully request that the objection to claims 5, 7 and 32 be withdrawn.

Based on the foregoing, Applicants believe that the present application has been placed in condition of allowance. An early and favorable consideration is earnestly and respectfully requested.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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